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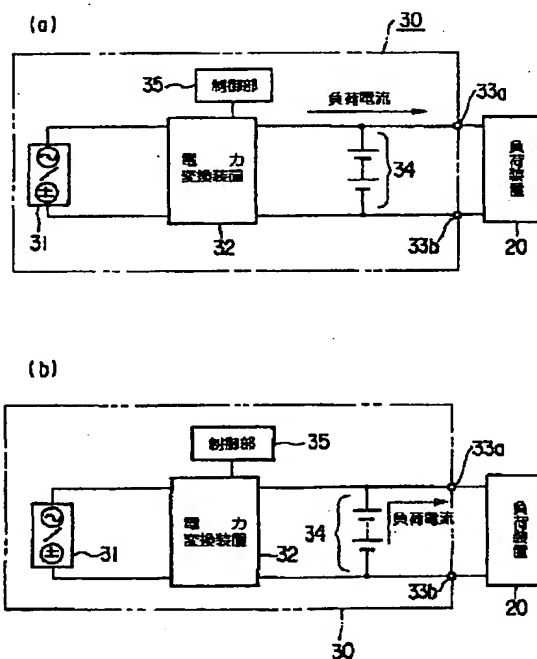
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(54)【発明の名称】 無停電給電装置及び蓄電池劣化判定方法

(57)【要約】

【課題】蓄電池の放電率が高い場合であっても蓄電池の劣化を容易に判定することができる無停電給電装置を提供すること。

【解決手段】負荷装置20に直流電流を供給する電力変換装置32と、出力端子に並列に接続されるとともに、電力変換装置32作動時は浮動充電され、かつ、電力変換装置32非作動時は負荷装置20に所定の直流電流を供給する蓄電池34と、電力変換装置32の出力電圧を制御するとともに、その出力電流を計測する制御部35とを備え、制御部35は、電力変換装置32の出力電圧を負荷装置20が正常動作する電圧以上であって、かつ、蓄電池34の開放電圧より低い電圧まで低下させ、電力変換装置32の出力電流が所定値以上になるまでの経過時間に基づいて蓄電池34の劣化を判定するようにした。



【特許請求の範囲】

【請求項1】 負荷部に直流電流を供給する電力供給部

と、
前記出力端子に並列に接続されるとともに、前記電力供給部作動時は浮動充電され、かつ、前記電力供給部非作動時は前記負荷部に所定の直流電流を供給する蓄電池と、

前記電力供給部の出力電圧を制御するとともに、その出力電流を計測する制御部とを備え、

前記制御部は、前記電力供給部の出力電圧を前記負荷部が正常動作する電圧以上であって、かつ、前記蓄電池の開放電圧より低い電圧まで低下させ、前記電力供給部の出力電流が所定値以上になるまでの経過時間に基づいて前記蓄電池の劣化を判定することを特徴とする無停電給電装置。

【請求項2】 負荷部に直流電流を供給する電力供給部の出力端子に並列に接続されるとともに、前記電力供給部作動時は浮動充電され、かつ、前記電力供給部非作動時は前記負荷部に所定の直流電流を供給する蓄電池の劣化を判定する蓄電池劣化判定方法において、

前記電力供給部の出力電圧を前記負荷部が正常動作する電圧以上であって、かつ、前記蓄電池の開放電圧より低い電圧まで低下させて前記蓄電池を放電状態とする電圧降下工程と、

この電圧降下工程において、前記電力供給部から前記負荷部への電流値に基づいて前記蓄電池の劣化を判定する劣化判定工程とを具備することを特徴とする蓄電池劣化判定方法。

【請求項3】 前記劣化判定工程は、前記電流値が所定値以上になるまでの経過時間に基づいて判定を行うことを特徴とする請求項2に記載の蓄電池劣化判定方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、蓄電池を備えることにより直流電流を停止することなく供給する無停電給電装置に関し、特に蓄電池の劣化を判定することができるものに関する。また、直流電流を出力する電力供給部に接続された蓄電池の劣化を判定するための蓄電池劣化判定方法に関する。

【0002】

【従来の技術】 図3の(a)、(b)は、従来の無停電給電システムの一例である無停電給電装置10の一例を示す構成図、図4は従来の蓄電池劣化判定方法における蓄電池端子電圧を示すグラフ、図5は蓄電池の放電特性を示すグラフである。

【0003】 無停電給電装置10は、交流又は直流の電源11と、この電源11の出力端子に接続され、所定の電圧を出力する電力変換装置12とを備えている。電力変換装置12は、通信機器や電子計算機等の負荷装置20に接続される外部出力端子13a、13bとを備えて

いる。また、電力変換装置12の外部出力端子13a、13bには蓄電池14が接続されている。さらに、図3中15は、電力変換装置12の出力電圧を制御するとともに、蓄電池端子電圧を計測する制御部を示している。

【0004】 このように構成された無停電給電装置10は、図3の(a)に示すように、通常は電源11からの電力を電力変換装置12において変換し、負荷装置20に供給するとともに、蓄電池14へ浮動充電している。

【0005】 なお、電源11からの電力の供給が何らかの原因で停止した場合には、蓄電池14が放電することで負荷装置20に電力が供給され、負荷装置20は連続的に電力の供給を受けることができる。

【0006】 一方、蓄電池14の劣化が進んでいると、停電した場合に、所定の性能を発揮せず、負荷装置20の電力の供給が停止するという問題が発生する。このため、定期的に蓄電池14の劣化を判定する必要がある。

【0007】 蓄電池14の劣化は次のようにして判定する。なお、図4は、蓄電池14の劣化を判定する際の蓄電池端子電圧の変化を示すグラフである。なお、図4中 V_1 は通常の作動時における電圧、すなわち浮動充電電圧（電力変換装置定常出力設定電圧）であり、 V_2 は負荷装置20が正常動作を維持できる最低の電圧、すなわち電力変換装置出力低下時設定電圧であり、 V_3 は放電終止電圧（負荷装置許容最低入力電圧）、 ΔV は電圧計測誤差である。

【0008】 制御部15により電力変換装置12の出力電圧を電力変換装置出力低下時設定電圧 V_2 まで低下させ、図3の(b)に示すように、蓄電池14を放電状態とし、蓄電池14の端子電圧を測定する。このとき、図4中Qに示すように、蓄電池端子電圧が検出電圧 V まで低下した場合には、劣化していると判断する。なお、図4中二点鎖線Rに示すように、検出電圧 V まで低下しなかった場合には、劣化していないと判断する。

【0009】

【発明が解決しようとする課題】 上述したような蓄電池の劣化判定方法では、次のような問題があった。すなわち、蓄電池14が劣化している場合、蓄電池端子電圧は出力低下時設定電圧 V_2 まで低下し、電力変換装置が出力低下時設定電圧 V_2 にて負荷装置20へ電力を供給することになる。このため、蓄電池端子電圧は、出力低下時設定電圧 V_2 より下がらない。よって、検出電圧 V は、電力変換装置の出力低下時設定電圧 V_2 より電圧計測誤差 ΔV 以上高い電圧値とすることで、蓄電池端子電圧の低下を確実に検出している。

【0010】 しかしながら、蓄電池は図4に示すように、放電率が高くなると放電初期から蓄電池端子電圧が低くなる特性がある。なお、図4中Cは蓄電池定格容量を示し、0.1C、0.16C、0.23C、0.6Cの各数字は蓄電池の放電率である。

【0011】 検出電圧 V は、電力変換装置の出力低下

時設定電圧 V_f より高い電圧値であるため、放電率が高い場合には、蓄電池 14 放電開始直後に蓄電池端子電圧が検出電圧 V 。以下である電力変換装置出力低下時設定電圧 V_f 。近くまで低下する場合があった。このため、蓄電池端子電圧が検出電圧 V 。とならず、蓄電池 14 の劣化が判定できないという問題があった。

【0012】そこで本発明は、蓄電池の放電率が高い場合であっても蓄電池の劣化を容易に判定することができる無停電給電装置及び蓄電池の劣化判定方法を提供することを目的としている。

【0013】

【課題を解決するための手段】上記課題を解決し目的を達成するために、請求項 1 に記載された発明は、負荷部に直流電流を供給する電力供給部と、前記出力端子に並列に接続されるとともに、前記電力供給部作動時は浮動充電され、かつ、前記電力供給部非作動時は前記負荷部に所定の直流電流を供給する蓄電池と、前記電力供給部の出力電圧を制御するとともに、その出力電流を計測する制御部とを備え、前記制御部は、前記電力供給部の出力電圧を前記負荷部が正常動作する電圧以上であって、かつ、前記蓄電池の開放電圧より低い電圧まで低下させ、前記電力供給部の出力電流が所定値以上になるまでの経過時間に基づいて前記蓄電池の劣化を判定するようにした。

【0014】請求項 2 に記載された発明は、負荷部に直流電流を供給する電力供給部の出力端子に並列に接続されるとともに、前記電力供給部作動時は浮動充電され、かつ、前記電力供給部非作動時は前記負荷部に所定の直流電流を供給する蓄電池の劣化を判定する蓄電池劣化判定方法において、前記電力供給部の出力電圧を前記負荷部が正常動作する電圧以上であって、かつ、前記蓄電池の開放電圧より低い電圧まで低下させて前記蓄電池を放電状態とする電圧降下工程と、この電圧降下工程において、前記電力供給部から前記負荷部への電流値に基づいて前記蓄電池の劣化を判定する劣化判定工程とを具備するようにした。

【0015】請求項 3 に記載された発明は、前記劣化判定工程は、前記電流値が所定値以上になるまでの経過時間に基づいて判定を行うようにした。上記手段を講じた結果、次のような作用が生じる。すなわち、請求項 1 に記載された発明では、制御部は、電力供給部の出力電圧を負荷部が正常動作する電圧以上であって、かつ、蓄電池の開放電圧より低い電圧まで低下させることで、蓄電池を放電させる。蓄電池が放電し、電圧が低下すると、電力供給部からの電力供給が再開されるので、これを検出することにより、蓄電池の劣化を判定することができる。

【0016】請求項 2 に記載された発明では、電力供給部の出力電圧を負荷部が正常動作する電圧以上であって、かつ、蓄電池の開放電圧より低い電圧まで低下させ

ることで、蓄電池を放電させる。蓄電池が放電し、電圧が低下すると、電力供給部からの電力供給が再開されるので、これを検出することにより、蓄電池の劣化を判定することができる。

【0017】請求項 3 に記載された発明では、電流値が所定値以上になるまでの経過時間に基づいて判定を行うようにしたので、容易に蓄電池の劣化を判定することができる。

【0018】

10 【発明の実施の形態】図 1 の (a)、(b) は本発明の一実施の形態に係る蓄電池劣化判定方法が適用される無停電給電装置 30 を示す図であり、図 2 は、蓄電池 34 の劣化を判定する際の蓄電池端子電圧、蓄電池 34 の出力電流及び電力変換装置 32 の出力電流の変化を示すグラフである。なお、これらの図において上述した図 3、4 と同一機能部分には同一符号を付し、その詳細な説明は省略する。

20 【0019】無停電給電装置 30 は、交流又は直流の電源 31 と、この電源 31 の出力端子に接続され、所定の電圧を出力する電力変換装置 32 とを備えている。電力変換装置 32 は、通信機器や電子計算機等の負荷装置 20 に接続される外部出力端子 33a、33b とを備えている。また、電力変換装置 32 の外部出力端子 33a、33b には蓄電池 34 が接続されている。さらに電力変換装置 32 には、その出力電圧を制御するとともに、出力電流を計測する制御部 35 が接続されている。

30 【0020】このように構成された無停電給電装置 30 は、図 1 の (a) に示すように、定常動作時は、電源 31 からの電力を電力変換装置 32 において変換し、負荷装置 20 に供給するとともに、蓄電池 34 を浮動充電している。なお、電力変換装置 32 の出力電圧は、電源 31 の入力電圧や出力電圧が変動した場合でも常に一定の浮動充電電圧 V_f を出力できるような安定化機能を有している。

40 【0021】このような状態で電源 31 からの給電が一定時間以上（通常 2 4 時間以上）継続している場合には、蓄電池 34 は満充電状態であるため、蓄電池 34 への浮動充電電流は僅かであり、図 1 の (a) に示すように電力変換装置 32 の出力する電流の大部分は負荷電流として負荷装置 20 に供給されている。

【0022】また、図 1 の (b) に示すように、電源 31 からの電力の供給が何らかの原因で停止した場合には、蓄電池 34 が放電することで負荷装置 20 に電力が供給され、負荷装置 20 は連続的に電力の供給を受けることができる。

50 【0023】蓄電池 34 の劣化は次のようにして判定する。なお、図 2 の (a) 中 V_f は通常の作動時における電圧、すなわち浮動充電電圧（電力変換装置定常出力設定電圧）であり、 V_c は負荷装置 20 が正常動作を維持できる最低の電圧、すなわち電力変換装置出力低下時設

定電圧であり、 V_E は放電終止電圧（負荷装置許容最低入力電圧）である。また、図 2 の（b）は、蓄電池 34 の出力電流、図 2 の（c）は電力変換装置 32 の出力電流の変化を示すグラフである。

【0024】電力変換装置 32 の出力電圧を電力変換装置出力低下時設定電圧 V_L まで低下させ、蓄電池 34 を放電状態とし、蓄電池 34 の端子電圧を測定する。これに伴って、蓄電池 34 が劣化していると、一定時間後に出力低下時設定電圧 V_L まで蓄電池端子電圧が低下する。電力変換装置 32 から負荷装置 20 への電力の供給が再開される。

【0025】図 2 の（b）、（c）に示すように、蓄電池 34 の出力電流が低下すると、電力変換装置 32 から負荷装置 20 へ電流が供給される。この電力変換装置 32 からの出力電流が制御部 35 により検出される。制御部 35 では、電力変換装置 32 の出力電圧を電力変換装置出力低下時設定電圧 V_L まで低下させてから、出力電流が検出されるまでの時間 t を計測し、この時間 t が予め定められた時間以下である場合には、蓄電池 34 が劣化している判定する。

【0026】上述したように、本実施の形態に係る無停電給電装置 30 においては、蓄電池 34 の放電率が高い場合であっても、電力変換装置 32 の出力電流を検出することで、容易に蓄電池 34 の劣化を判定できる。

【0027】なお、制御部 35 においては、電力変換装置 32 の出力電流の有無を検出するようにしてもよく、また、出力電流の大きさを検出するようにしてもよい。なお、本発明は実施の形態に限定されるものではなく、本発明の要旨を逸脱しない範囲で種々変形実施可能であるのは勿論である。

【0028】

【発明の効果】請求項 1 に記載された発明によれば、制御部は、電力供給部の出力電圧を負荷部が正常動作する *

* 電圧以上であって、かつ、蓄電池の開放電圧より低い電圧まで低下させることで、蓄電池を放電させる。蓄電池が放電し、電圧が低下すると、電力供給部からの電力供給が再開されるので、これを検出することにより、蓄電池の劣化を判定することができる。

【0029】請求項 2 に記載された発明によれば、電力供給部の出力電圧を負荷部が正常動作する電圧以上であって、かつ、蓄電池の開放電圧より低い電圧まで低下させることで、蓄電池を放電させる。蓄電池が放電し、電圧が低下すると、電力供給部からの電力供給が再開されるので、これを検出することにより、蓄電池の劣化を判定することができる。

【0030】請求項 3 に記載された発明によれば、電流値が所定値以上になるまでの経過時間に基づいて判定を行うようにしたので、容易に蓄電池の劣化を判定することができる。

【図面の簡単な説明】

【図 1】本発明の一実施の形態に係る無停電給電装置の構成を示す図。

20 【図 2】同無停電給電装置における蓄電池劣化判定時の蓄電池端子電圧、蓄電池の出力電流及び電力変換装置の出力電流の変化を示す図。

【図 3】従来の無停電給電装置の構成を示す図。

【図 4】蓄電池劣化判定方法における蓄電池端子電圧の変化を示す図。

【図 5】蓄電池の放電特性を示す図。

【符号の説明】

30…無停電給電装置

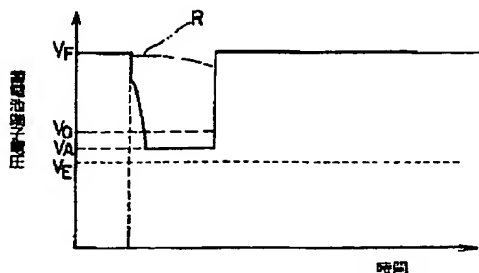
31…電源

30 32…電力変換装置

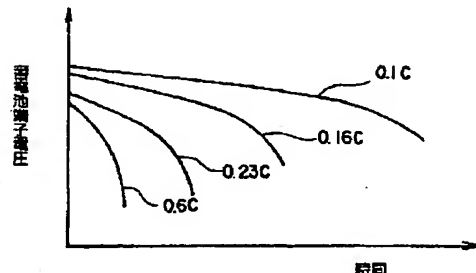
34…蓄電池

35…制御部

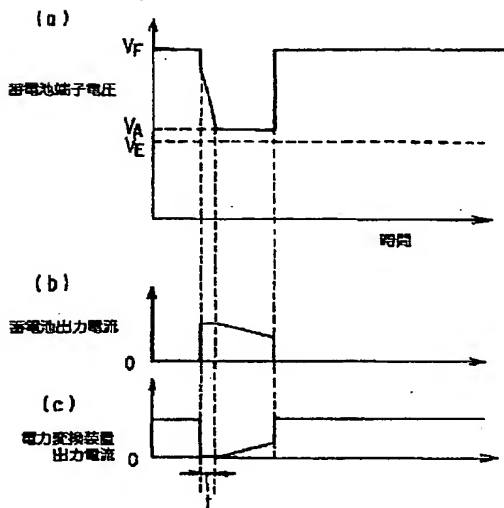
【図 4】



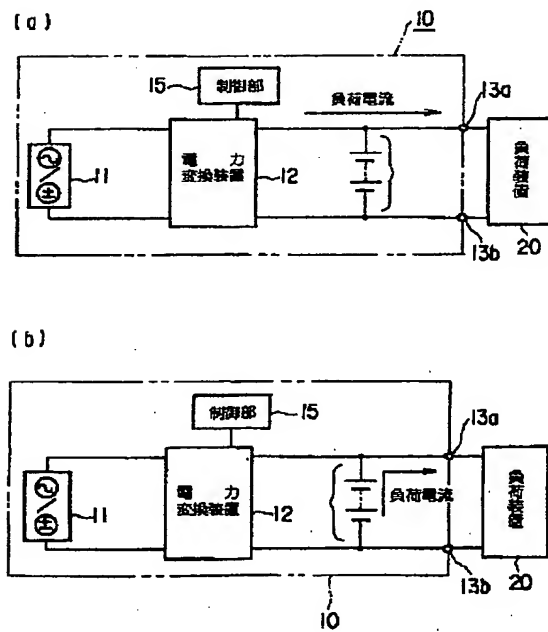
【図 5】



【圖2】



【図 3】



フロントページの続き

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(21)Application number : 10-213918

(71)Applicant : NTT POWER & BUILDING FACILITIES INC

(22)Date of filing : 29.07.1998

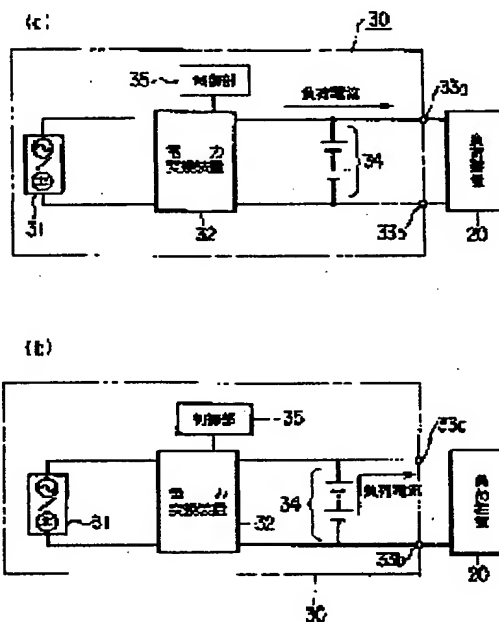
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KAWAGOE YUJI

(54) UNINTERRUPTIBLE POWER SUPPLY DEVICE AND METHOD FOR DISCRIMINATING DETERIORATION OF BATTERY

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an uninterruptible power supply device which can easily discriminate deterioration of a battery, even when the discharging rate of the battery is high.

SOLUTION: An uninterruptible power supply device is provided with a power converter 32, which supplies a direct current to a load device 20, a battery 34 which is connected in parallel with the output terminal of the supply device, is trickle charged when the converter 32 is operated, and supplies a prescribed direct current to the load device 20 when the converter 32 is not operated, and a control section 35 which controls the output voltage of the converter 32, as well as measures the output current of the converter 32. A control section 35 discriminates deterioration of the battery 34 based on the time required, until the output current of the converter 32 becomes a prescribed value or higher, after lowering the output voltage of the converter 32 to a value which is higher than the normal operating voltage of the load device 20, but lower than the open voltage of the battery 34.



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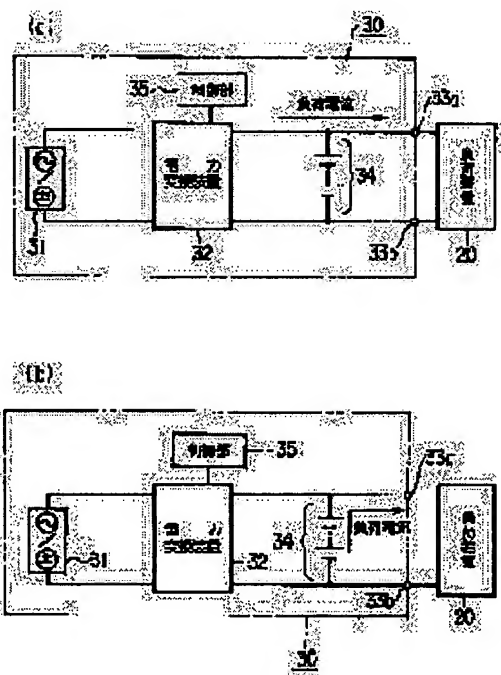
KAWAGOE YUJI

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CLAIMS

[Claim(s)]

[Claim 1] While connecting with juxtaposition at said output terminal with the power feed zone which supplies a direct current to the load section While floating charge of the time of said power feed zone actuation is carried out and controlling the battery which supplies a predetermined direct current to said load section, and the output voltage of said power feed zone at the time of said power feed zone un-operating It has the control section which measures the output current. Said control section It is more than the electrical potential difference to which said load section carries out normal actuation of the output voltage of said power feed zone. And the feeder system characterized by judging degradation of said battery based on elapsed time until it makes it fall to a low electrical potential difference and the output current of said power feed zone consists of open circuit voltage of said battery beyond a predetermined value non-cut [the electric current] off.

[Claim 2] While connecting with juxtaposition at the output terminal of the power feed zone which supplies a direct current to the load section In the battery degradation judging approach of judging degradation of the battery by which floating charge of the time of said power feed zone actuation is carried out, and a predetermined direct current is supplied to said load section at the time of said power feed zone un-operating In the voltage drop process which is more than the electrical potential difference to which said load section carries out normal actuation of the output voltage of said power feed zone, and is reduced to an electrical potential difference lower than the open circuit voltage of said battery, and makes said battery a discharge condition, and this voltage drop process The battery degradation judging approach characterized by providing the degradation judging process of judging degradation of said battery based on the current value from said power feed zone to said load section.

[Claim 3] Said degradation judging process is the battery degradation judging approach according to claim 2 characterized by judging based on elapsed time until said current value becomes beyond a predetermined value.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to what can judge especially degradation of a battery about the feeder system supplied without stopping a direct current by having a battery non-cut [the electric current] off. Moreover, it is related with the battery degradation judging approach for judging degradation of the battery connected to the power feed zone which outputs a direct current.

[0002]

[Description of the Prior Art] The block diagram showing an example of the feeder system 10 (a) of drawing 3 and whose (b) are examples of the conventional non-cut [the electric current] off electric supply system non-cut [the electric current] off, the graph which shows the battery terminal voltage in the battery degradation judging approach of the former [drawing 4], and drawing 5 are graphs which show the discharge property of a battery.

[0003] It connected with the output terminal of the power source 11 of an alternating current or a direct current, and this power source 11, and the feeder system 10 non-cut [the electric current] off is equipped with the power converter 12 which outputs a predetermined electrical potential difference. The power converter 12 is equipped with the external output terminals 13a and 13b connected to the load equipments 20, such as communication equipment and a computer. Moreover, the battery 14 is connected to the external output terminals 13a and 13b of a power converter 12.

Furthermore, 15 in drawing 3 shows the control section which measures battery terminal voltage while controlling the output voltage of a power converter 12.

[0004] Thus, as shown in (a) of drawing 3, while the constituted feeder system 10 non-cut [the electric current] off usually changes the power from a power source 11 in a power converter 12 and supplies it to load equipment 20, floating charge of it is carried out to the battery 14.

[0005] In addition, when supply of the power from a power source 11 stops by a certain cause, power is supplied to load equipment 20 because a battery 14 discharges, and load equipment 20 can receive supply of power continuously.

[0006] On the other hand, when degradation of a battery 14 was progressing and the electric current is cut off, the predetermined engine performance is not demonstrated but the problem that supply of the power of load equipment 20 stops occurs. For this reason, it is necessary to judge degradation of a battery 14 periodically.

[0007] Degradation of a battery 14 is judged as follows. In addition, drawing 4 is a graph which shows change of the battery terminal voltage at the time of judging degradation of a battery 14. In addition, the inside VF of drawing 4 is the electrical potential difference at the time of the usual actuation, i.e., a floating charge electrical potential difference, (power-converter stationary output programmed voltage), and is VA. It is a programmed voltage at the time of the minimum electrical potential difference on which load equipment 20 can maintain normal actuation, i.e., power-converter loss of power, and VE. Discharge final voltage (the load equipment permission minimum input voltage) and ΔV are electrical-potential-difference measurement errors.

[0008] a control section 15 -- the output voltage of a power converter 12 -- the time of power-converter loss of power -- programmed voltage VA up to -- as it is made to fall and is shown in (b) of drawing 3, a battery 14 is made into a discharge condition and the terminal voltage of a battery 14 is measured. at this time, it is shown in [Q] drawing 4 -- as -- battery terminal voltage -- detection electrical potential difference V0 up to -- when it falls, it is judged that it has deteriorated. in addition, it is shown in the two-dot chain line R in drawing 4 -- as -- detection electrical potential difference V0 up to -- when it does not fall, it is judged that it has not deteriorated.

[0009]

[Problem(s) to be Solved by the Invention] There were the following problems by the degradation judging approach of a battery which was mentioned above. Namely, when the battery 14 has deteriorated, battery terminal voltage falls to a

programmed voltage VA at the time of loss of power, and a power converter is a programmed voltage VA at the time of loss of power. Power will be supplied to load equipment 20. For this reason, battery terminal voltage is a programmed voltage VA at the time of loss of power. It does not fall. Therefore, detection electrical potential difference V0 It is a programmed voltage VA at the time of the loss of power of a power converter. It is considering as a high electrical-potential-difference value more than electrical-potential-difference measurement error ΔV , and the fall of battery terminal voltage is detected certainly.

[0010] However, a battery has the property that battery terminal voltage becomes low, from the early stages of discharge, when a discharge rate becomes high, as shown in drawing 4 . In addition, battery rated capacity is shown by the inside C of drawing 4 , and several characters each of 0.1C, 0.16C, 0.23C, and 0.6C are the discharge rate of a battery.

[0011] Detection electrical potential difference V0 It is a programmed voltage VA at the time of the loss of power of a power converter. Since it is a high electrical-potential-difference value, when a discharge rate is high, battery terminal voltage is the detection electrical potential difference V0 immediately after battery 14 discharge starting. It is a programmed voltage VA at the time of the power-converter loss of power which is the following. There was a case where it fell to near. For this reason, battery terminal voltage is the detection electrical potential difference V0. It did not become but there was a problem that degradation of a battery 14 could not be judged.

[0012] Then, even if this invention is the case that the discharge rate of a battery is high, it aims at offering the degradation judging approach of the feeder system non-cut [the electric current] off and battery which can judge degradation of a battery easily.

[0013]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem and to attain the purpose, invention indicated by claim 1 While connecting with juxtaposition at said output terminal with the power feed zone which supplies a direct current to the load section While floating charge of the time of said power feed zone actuation is carried out and controlling the battery which supplies a predetermined direct current to said load section, and the output voltage of said power feed zone at the time of said power feed zone un-operating It has the control section which measures the output current. Said control section Are more than the electrical potential difference to which said load section carries out normal actuation of the output voltage of said power feed zone, and it is made to fall to an electrical potential difference lower than the open circuit voltage of said battery, and degradation of said battery was judged based on elapsed time until the output current of said power feed zone becomes beyond a predetermined value.

[0014] While connecting with juxtaposition at the output terminal of the power feed zone which supplies a direct current to the load section, invention indicated by claim 2 In the battery degradation judging approach of judging degradation of the battery by which floating charge of the time of said power feed zone actuation is carried out, and a predetermined direct current is supplied to said load section at the time of said power feed zone un-operating In the voltage drop process which is more than the electrical potential difference to which said load section carries out normal actuation of the output voltage of said power feed zone, and is reduced to an electrical potential difference lower than the open circuit voltage of said battery, and makes said battery a discharge condition, and this voltage drop process The degradation judging process of judging degradation of said battery based on the current value from said power feed zone to said load section was provided.

[0015] Invention indicated by claim 3 was made to judge based on elapsed time until, as for said degradation judging process, said current value becomes beyond a predetermined value. As a result of providing the above-mentioned means, the following operations arise. That is, a control section is more than an electrical potential difference to which the load section carries out normal actuation of the output voltage of a power feed zone, and is making it fall to an electrical potential difference lower than the open circuit voltage of a battery, and makes a battery discharge in invention indicated by claim 1. If a battery discharges and an electrical potential difference falls, since the electric power supply from a power feed zone will be resumed, degradation of a battery can be judged by detecting this.

[0016] It is more than the electrical potential difference to which the load section carries out normal actuation of the output voltage of a power feed zone, and a battery is made to discharge by invention indicated by claim 2 by making it fall to an electrical potential difference lower than the open circuit voltage of a battery. If a battery discharges and an electrical potential difference falls, since the electric power supply from a power feed zone will be resumed, degradation of a battery can be judged by detecting this.

[0017] In invention indicated by claim 3, since it was made to judge based on elapsed time until a current value becomes beyond a predetermined value, degradation of a battery can be judged easily.

[0018]

[Embodiment of the Invention] (a) of drawing 1 and (b) are drawings showing the feeder system 30 with which the

battery degradation judging approach concerning the gestalt of 1 operation of this invention is applied non-cut [the electric current] off, and drawing 2 is a graph which shows change of the battery terminal voltage at the time of judging degradation of a battery 34, the output current of a battery 34, and the output current of a power converter 32. In addition, the same sign is given to drawing 3 mentioned above in these drawings, and the same functional division as 4, and the detailed explanation is omitted.

[0019] It connected with the output terminal of the power source 31 of an alternating current or a direct current, and this power source 31, and the feeder system 30 non-cut [the electric current] off is equipped with the power converter 32 which outputs a predetermined electrical potential difference. The power converter 32 is equipped with the external output terminals 33a and 33b connected to the load equipments 20, such as communication equipment and a computer. Moreover, the battery 34 is connected to the external output terminals 33a and 33b of a power converter 32. Furthermore, while controlling the output voltage, the control section 35 which measures the output current is connected to the power converter 32.

[0020] Thus, at the time of stationary actuation, as the constituted feeder system 30 non-cut [the electric current] off is shown in (a) of drawing 1, floating charge of the battery 34 is carried out while changing the power from a power source 31 in a power converter 32 and supplying load equipment 20. In addition, the output voltage of a power converter 32 is the floating charge electrical potential difference VF always fixed even when the input voltage and output voltage of a power source 31 are changed. It has the stabilization function which can be outputted.

[0021] When the electric supply from a power source 31 is continuing beyond fixed time amount (usually 24 hours or more) in such the condition, since a battery 34 is in a full charge condition, the floating charge currents to a battery 34 are few, and most currents which a power converter 32 outputs as shown in (a) of drawing 1 are supplied to load equipment 20 as the load current.

[0022] Moreover, as shown in (b) of drawing 1, when supply of the power from a power source 31 stops by a certain cause, power is supplied to load equipment 20 because a battery 34 discharges, and load equipment 20 can receive supply of power continuously.

[0023] Degradation of a battery 34 is judged as follows. In addition, inside VF of (a) of drawing 2 It is the electrical potential difference at the time of the usual actuation, i.e., a floating charge electrical potential difference, (power-converter stationary output programmed voltage), and is VA. It is a programmed voltage at the time of the minimum electrical potential difference on which load equipment 20 can maintain normal actuation, i.e., power-converter loss of power, and VE. It is discharge final voltage (the load equipment permission minimum input voltage). Moreover, (b) of drawing 2 is the output current of a battery 34, and a graph with which (c) of drawing 2 shows change of the output current of a power converter 32.

[0024] the output voltage of a power converter 32 -- the time of power-converter loss of power -- programmed voltage VA up to -- it is made to fall, a battery 34 is made into a discharge condition, and the terminal voltage of a battery 34 is measured. if the battery 34 has deteriorated in connection with this -- fixed time amount after -- the time of loss of power -- programmed voltage VA up to -- battery terminal voltage falls. Supply of the power from the power converter 32 to load equipment 20 is resumed.

[0025] If the output current of a battery 34 declines as shown in (b) of drawing 2, and (c), a current will be supplied to load equipment 20 from a power converter 32. The output current from this power converter 32 is detected by the control section 35. a control section 35 -- the output voltage of a power converter 32 -- the time of power-converter loss of power -- programmed voltage VA up to -- the time amount t after making it fall until the output current is detected was measured, and in being below the time amount as which this time amount t was determined beforehand, the battery 34 has deteriorated -- it judges.

[0026] As mentioned above, even if it is the case that the discharge rate of a battery 34 is high, in the feeder system 30 concerning the gestalt of this operation non-cut [the electric current] off, it is detecting the output current of a power converter 32, and degradation of a battery 34 can be judged easily.

[0027] In addition, you may make it detect the existence of the output current of a power converter 32, and may make it detect the magnitude of the output current in a control section 35. In addition, as for this invention, it is needless to say for deformation implementation to be variously possible in the range which is not limited to the gestalt of operation and does not deviate from the summary of this invention.

[0028]

[Effect of the Invention] According to invention indicated by claim 1, a control section is more than an electrical potential difference to which the load section carries out normal actuation of the output voltage of a power feed zone, and is making it fall to an electrical potential difference lower than the open circuit voltage of a battery, and makes a battery discharge. If a battery discharges and an electrical potential difference falls, since the electric power supply from

a power feed zone will be resumed, degradation of a battery can be judged by detecting this.

[0029] According to invention indicated by claim 2, it is more than the electrical potential difference to which the load section carries out normal actuation of the output voltage of a power feed zone, and a battery is made to discharge by making it fall to an electrical potential difference lower than the open circuit voltage of a battery. If a battery discharges and an electrical potential difference falls, since the electric power supply from a power feed zone will be resumed, degradation of a battery can be judged by detecting this.

[0030] Since it was made to judge based on elapsed time until a current value becomes beyond a predetermined value according to invention indicated by claim 3, degradation of a battery can be judged easily.

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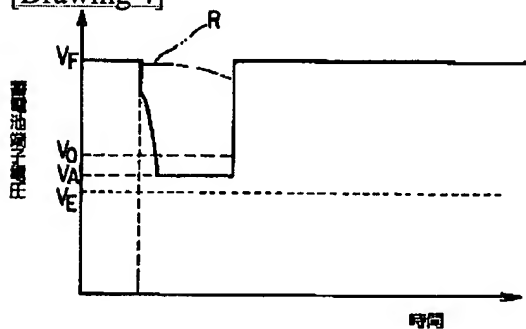
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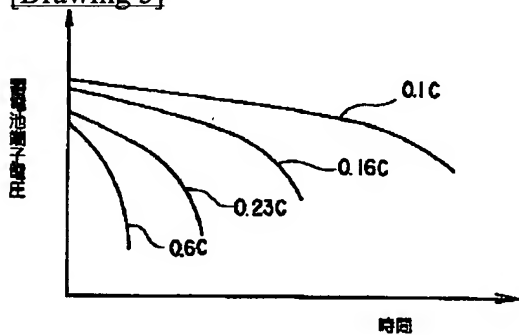
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DRAWINGS

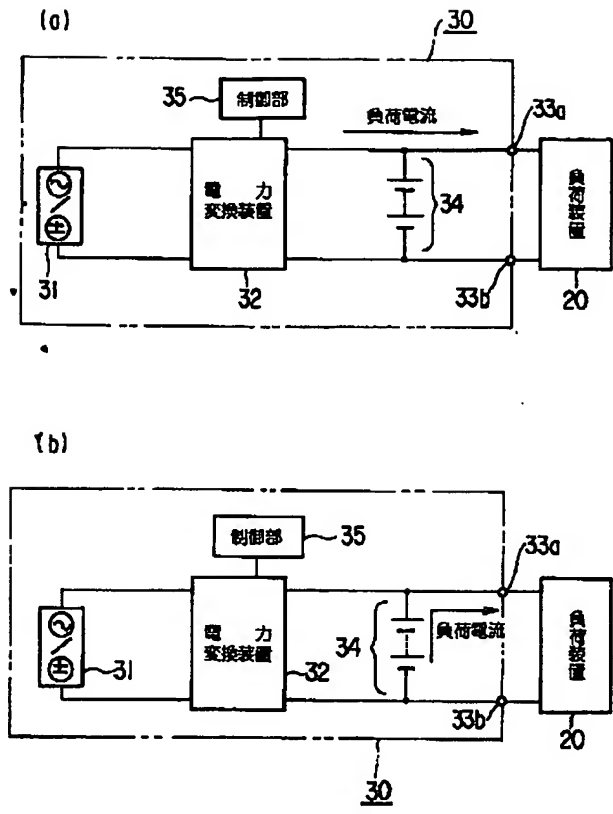
[Drawing 4]



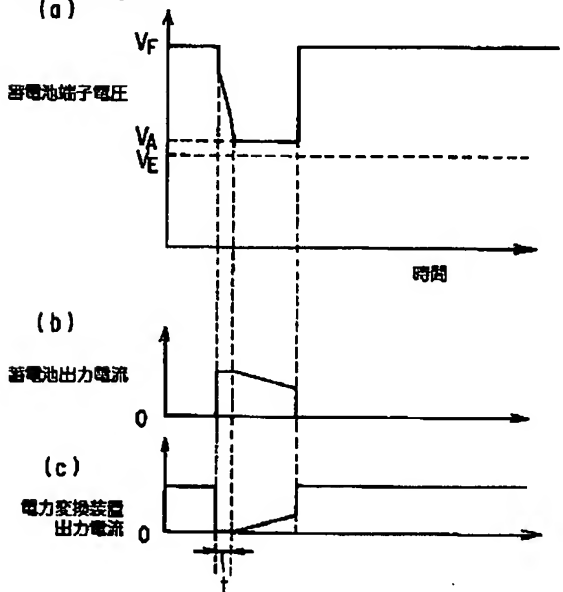
[Drawing 5]



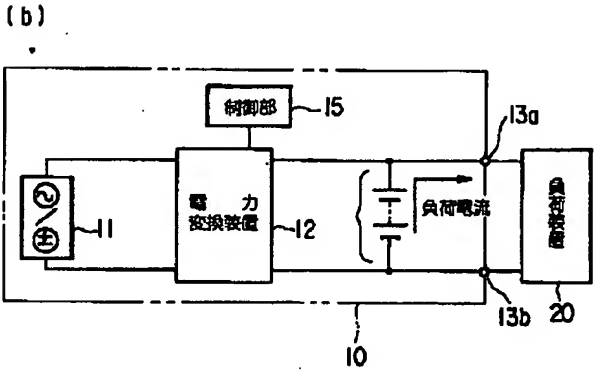
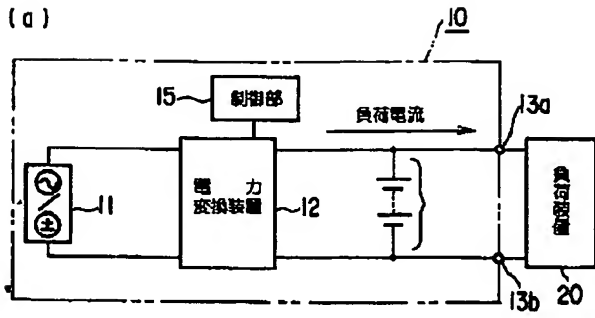
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]